



PROBABLE MAXIMUM PRECIPITATION STUDY PUBLIC QUESTIONS AND COMMENTS

During the dam safety study, questions have been raised about the 1995 site-specific Probable Maximum Precipitation (PMP) study prepared by the National Weather Service (NWS). This fact sheet will present some of the most frequently asked questions/comments with appropriate responses.

1. **Why is the PMP used for dam safety?** The design criteria for construction of structures with a high hazard potential, such as dams, have included an assessment of the largest flood to which a structure might be exposed during its lifetime. Structures with a high hazard potential are those where failure poses the potential for significant loss of life and high flood damages to residents downstream. This standard has been set for dams since failure of the structure may induce discharges and consequences several times more severe than for the flood prior to construction of the dam. The State of Colorado also uses the PMP standard in determining the hydrologic adequacy of dams within the state.

2. **“Several agencies have already reviewed the Corps rain study and think these number are highly inflated” and “Experts in the fields of Meteorology and Hydrology have seriously questioned the storm used to determine the PMF for this project.”** The NWS has responded to the second set of comments submitted on the Cherry Creek basin site-specific PMP study. Please refer the NWS letter dated MaRCH 5, 1999. Corps has and will continue to make the report available to all those requesting it. As a comparison with other calculated PMF values, the Plum Creek PMF at Louviers is 564,000 cfs for 308 square miles. This is similar the current PMF for Cherry Creek of 524,000 cfs for 386 square miles.

3. **I’ve read the PMP is 29 inches of rain in 24 hours?** The current site-specific PMP study has a total rainfall (averaged over the basin) of 24.7 inches in 72 hours. About 16.7 inches of this rainfall occurs during an 8-hour period.

4. **Doesn’t Palmer Ridge prevent a PMP from occurring in Cherry Creek?** The NWS addressed this in its response dated July 10, 1997. The NWS does believe that although Palmer Ridge makes it more difficult for the extreme storms to form over the Cherry Creek basin, it is still possible for these storms to occur over the basin.

5. **Cherry Creek has never had severe flooding.** Using a similar approach on Plum Creek prior to the 1965 flood would have lead to erroneous conclusions. For the 22-years of gaging record prior to 1965 (Louviers gage), the maximum discharge recorded for Plum Creek was 3,800 cubic feet per second (cfs). On June 16, 1965 a flow of 154,000 cfs was recorded: this exceeded the previous record discharge by 40 times. The following information of Cherry Creek flooding was taken from the Colorado webpage for Noteworthy Colorado floods: (<http://www.crh.noaa.gov/den/floods.html>)

- May 19-20, 1864. Heavy rain over the upper basin of Cherry Creek caused 19 deaths along Cherry Creek and the South Platte River in Denver



- August 2-3, 1933. Three to nine inches of rain in 9 hours caused Castlewood Dam on Cherry Creek to fail. Seven people died in Denver. Damage was estimated at 1 million dollars.
- May 30-31, 1935. Up to 10 inches of rain fell in the Republican River Basin in Eastern Colorado causing 6 deaths and more than a million dollars in damage.
- May 9, 1957. Four inches of rain fell in 5 hours in the Toll Gate Creek Basin caused flooding which killed 3 people in a car in Aurora.
- June 14-18, 1965. A general storm with numerous cloudbursts affected most of Eastern Colorado. Approximately 20 people died. Approximately 600 million dollars damage was incurred. Cherry Creek pool elevation on August 1, 1965 was 5562.9.
- May 1973. Prolonged rains of up to 6 inches on May 5th and 6th in the South Platte Basin, along with melting of a large snow pack, produced major flooding during the next two weeks along the South Platte River. This produced the highest Cherry Creek pool elevation on June 3, 1973 of 5565.8.

6. **What is probability of PMP?** The definition of the PMP is: “Theoretically the greatest depth of precipitation for a given duration that is physically possible over a given size storm area at a particular geographical location at a certain time of year.” In other words, the PMP is a physical upper bound on precipitation based on location, duration, and storm area. As an upper bound, the PMP does not have a probability of occurrence.

7. **The PMP study should be independently peer reviewed.** The NWS report was prepared by two hydrometeorologists and reviewed by their technical manager during its preparation in 1995. An author of Hydrometeorological Reports (HMR) 51, 52, and 55A was consulted as to the appropriateness of the procedures used in the site-specific study and agreed with them. Subsequently, the NWS completed an additional review in February of 1999. The reviewer concluded the “... approach is sound and within the current state of the art practices of PMP analyses.” In addition, there is “... no evidence to believe there are significant errors that would substantially change the results.”

8. **What runoff is needed to fill Cherry Creek today?** Starting at a conservation (“normal”) pool elevation of 5550 feet, about 11.5 inches of runoff would be required to reach pool elevation 5639.5 feet. This is the base of freeboard for the dam and the point at which the dam is considered to be subject to failure from wave action.

9. **Hydrometeorological Report (HMR) 57 states that PMP values range between 3.2 to 7.5 times the 100-year precipitation value for the Pacific Northwest. The Cherry Creek ratio is in the extreme upper range of these values.** These ratios for storms west of the Continental Divide and are different from those for storms east of the Continental Divide.

10. **The site-specific study used Kansas-Iowa storms.** Midwestern storms were not used in determining the storm depth-area values used by the site-specific PMP study.